

MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.,
Publishers.

SAN FRANCISCO, SATURDAY, MARCH 21, 1885.

VOLUME XLXX
Number 12.

The Interoceanic Ship Railway.

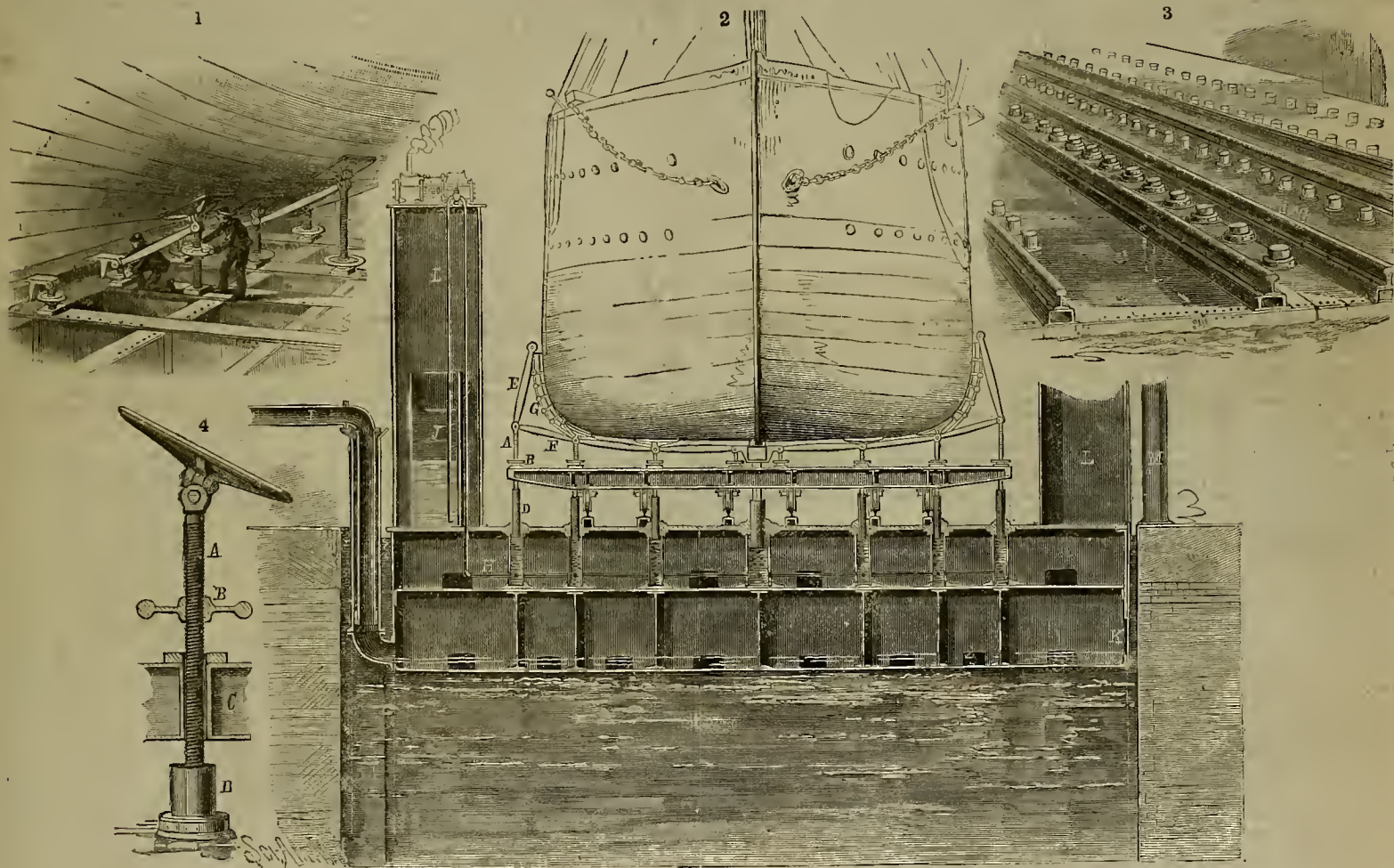
The attention of the whole world has been turned to the projects for getting vessels from the Pacific into the Atlantic, and *vice versa*, across the Isthmus, so as to save the long and expensive sea voyage around the cape. The engineering difficulties are great, and opinions are at variance as to the best means of overcoming them. The transisthmian projects which for many years have attracted the atten-

other engineers said would not work and which does work. The idea is a novel and original one, though it seems strange that no one ever thought before of its practicability. Mr. Eads hit upon the plan while studying the various canal projects, neither of which did he approve. He, of course, studied up carefully what might be brought forward as objections to his plan, and prepared to move its practicability.

He saw that by means of the ship railway he would reduce the distance from New York to

eral surveys for interoceanic railroads and canals, and Mr. E. L. Corthell, who had successfully carried out his plans at the mouths of the Mississippi, and is an expert in railroad construction, having been chief engineer of the West Shore Railroad. Being a practical man, Eads, naturally sought to discover a route that would furnish a substantial roadbed, possess something in the shape of harbors at either end, and above all a location outside of that, to the mariner, vexatious belt of perpetual calm.

the company to obtain the aid of any foreign government, and in consideration of this assistance the company is authorized by the terms of the concession to discriminate in favor of the commerce of such government against that of all other countries, save, of course, Mexico. The concession obtained, Mr. Eads set about having a careful survey made, topographical and physical, for the several previous surveys were with reference to a canal or an ordinary railway.



THE INTEROCEANIC SHIP RAILWAY—SECTIONAL ELEVATION OF PONTOON AND RAILWAY CRADLE.

tion of engineers may be divided, perhaps not improperly, into three classes: 1st. Those in which the construction will be at the mercy of floods. 2d. Those lacking good harbors. 3d. Those which empty into the doldrums or Zone of Calms. Of these three fatal objections, the Panama tide water canal scheme is open to the first and third, and the Nicaragua lifting-lock plan to the second and third. The ship railway project of Mr. James B. Eads, illustrated in this number is open to neither of these objections. It is not so costly, and will shorten by considerably over 1,000 miles the contemplated route via Panama between the Atlantic States and this city or the East Indies.

This project of the ship railway is one devised by Mr. James B. Eads, the distinguished engineer, perhaps best known for the successful engineering displayed in the designing and construction of the Mississippi jetty system, which

San Francisco, necessary for vessels to traverse, which is 15,687 miles by way of Cape Horn, by some 10,000 miles; and from New Orleans to San Francisco from 16,112 miles to something less than 4,000. He knew there would be difficulty in making people believe the plan feasible. He remembered the difficulty of introducing hydrogen gas in London, of sending the first vessel across the Atlantic under steam, of substituting the screw propeller for the paddle wheel, and how the original projectors have been scoffed at. Mr. Eads knew that ships had been going on and off lifting docks without injury from time immemorial, and was sure that vessels that could safely withstand the terrible buffeting of ocean waves could be moved over a smooth roadbed without fear of injury. In order to be sure as to the roadbed, he took with him to the Isthmus, Mr. J. J. Williams, an able engineer, who had made sev-

He found a cross section of the Isthmus of Tehuantepec which combined all these qualities; nay, more, for of all the routes across the narrow strip of land joining Mexico with South America, none shortens so much as this, the voyage from the Atlantic and Gulf States to California.

Having selected the site for his ship railway, he now sought a concession from the Mexican Government. This was obtained in 1881, and extends over a period of ninety-nine years from its date. It authorizes the construction across the Isthmus of Tehuantepec of a ship railway, an ordinary railway, and a line of telegraph. Besides this, it exempts all ships and merchandise *in transitu* from government duty, grants the concessionaire a million acres of public land, and guarantees protection during the construction and consequent operation of the works. To crown all, the right is given

The length of the whole railroad line will be about 134 miles from Atlantic to Pacific. Beginning on the Atlantic side, the route will start from the Gulf of Mexico, the ships sailing up the Coatzacoalcas river to Minatitlan, a distance of about 25 miles. From Minatitlan there extends for about 35 miles an alluvial plain having an underlying alluvial stratum of heavy, tenacious clay. On the high land and ridges clay, loam and sand are found. Next comes an undulating table-land, and then irregular mountain spurs of the main Cordilleras, run through the entire continent, making at this point one of the most marked depressions to be found in its whole length. From this basis the line passes through a valley formed by a small stream to the plains of Tarifa, where is situated the summit of the line. This is 736 feet above low tide. After traversing these

(Continued on page 190.)

Air Currents in Mines.

A consideration of the subject of spontaneous combustion in mines involves some knowledge of facts concerning the temperature and moisture of workings of coal mines in summer and in winter. The subject is also closely connected with falls of roof and sides. It is a fact that when blasting was not restricted in fiery and dusty mines in England, explosions were more frequent in winter than summer. On cold days dry and dusty mines are drier, and the dust more inflammable than on warm days. Some experiments recently made by one of the English Government mine inspectors, go to prove interesting facts. The hygrometer was placed as nearly as possible equidistant from roof, sides and floor.

The highest and lowest temperatures observed were—in summer, 88°, 62°; in winter, 84½°, 62°. The greatest and smallest amount of moisture in

Sierra County Mines.

The Bald Mountain Extension Company at Forest city cleaned up this week for six days' work of 45 men, 120 ounces, 12 pennyweights, at \$18.60 per ounce, which sold for \$2,233.16. The face of the main tunnel is in soft picking bed-rock and an appraisal has just been started there, for the pay gravel above promises, by the indications in sight, to be rich in gold. The new wire cable at the incline is working nicely and everything in the mine appears favorable for future success. A private letter states that a miner just down from the Ruby says that 45 men are now employed there and the clean-up was expected to be very good.

Hon. C. W. Cross, State Senator of Nevada county, arrived at Downieville on Monday to inspect the quartz ledges that he has agreed, with others, to purchase of Jerome York, provided the developments satisfy him. The prop-

Providence District.

(From our Traveling Correspondent.)

This mining district is situated in San Bernardino county about 120 miles east of Calico; being 24 miles north of the line of the A. & P. R. R. Fenner station is the shipping point for supplies and ore. Daily communication is had by H. J. Young's stage and express line. Comparatively speaking, the district is a new one. The mineral belt lies nearly north and south, extending a distance of nearly eight miles along the east slope of Providence mountain. The contact is a quartzite granite and porphyry, with lime formations between clay walls. Rich chutes and deposits of ore of quartz spar and carbonized zinc, are the principal milling ores. These ore bodies and vein matter exist with more regularity and firmness than in Calico, and depth demonstrates a concentration of the ore bodies indicating strong probabilities of the existence of a true fissure vein.

The Mines.

The development of the mines of Providence,

erty being owned by individuals who seek no notoriety and who are venturing their money, and so far have reaped a golden harvest, but little as to the mine's output is reported to the public. Since the erection of the company's mill, about two years ago, some \$1,500,000 in bullion has been produced.

Ore Treatment.

The Bonanza King mill, at Crow Town, a mile and a half distant from the mine, is the only mill in the district. It is a 10-stamp dry crushing process, somewhat similar to the "Boss" process, only that it is not continuous. The ores are dried after passing through the ore crusher. The batteries are supplied by self-feeders. From a car the dry crushings are started into pans, and afterwards pass through the settlers. The tailings are caught in tanks, the water drained off and pumped back in an elevated tank to be used again and again. This being advantageous on account of saving water, and the water recumped being a thorough salt solution, thereby saving much salt. The tailings are shoveled into cars and dumped from a high trussle-work near by. The mill has a

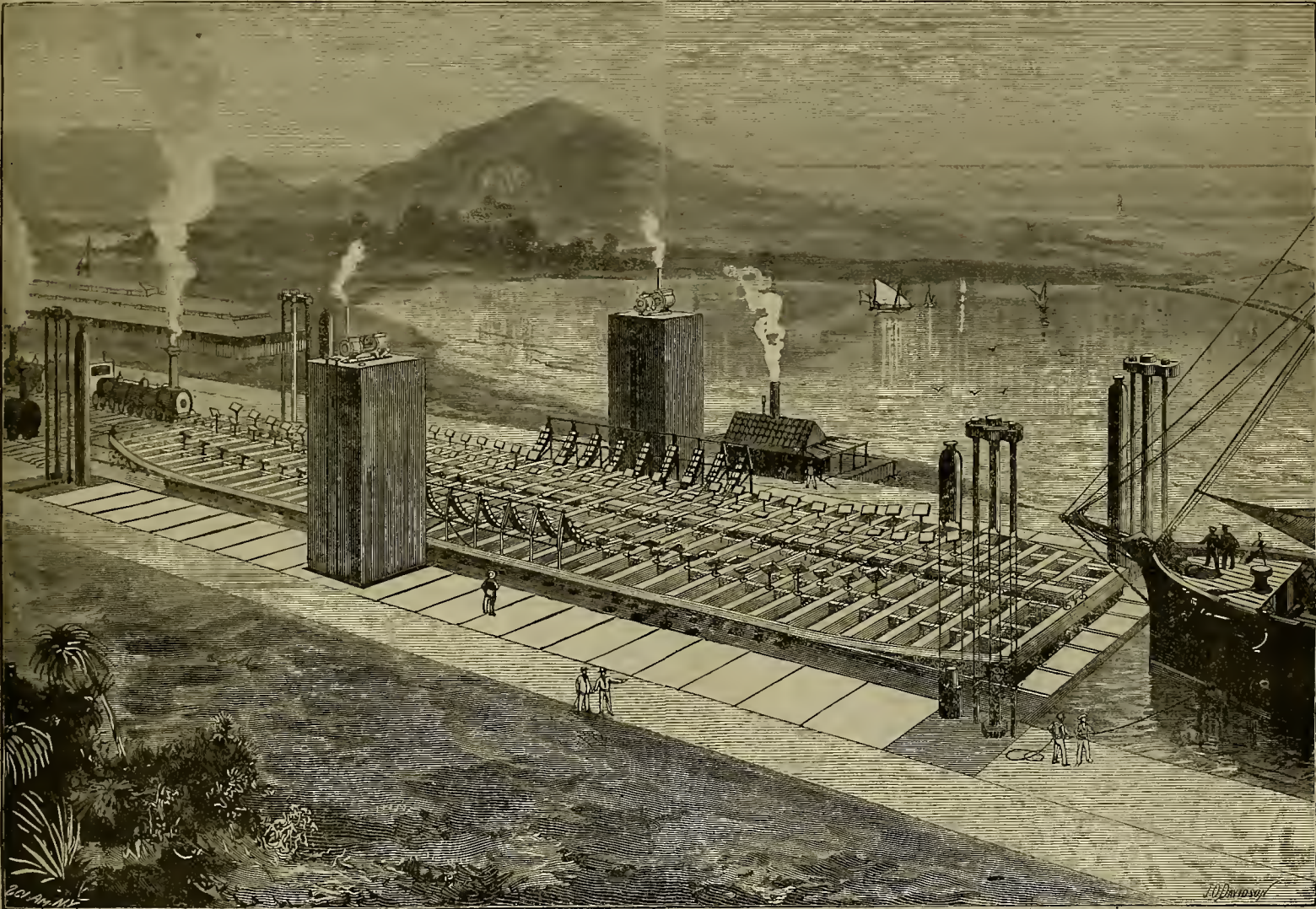


Fig. 5.—THE INTEROCEANIC SHIP RAILWAY—THE LIFTING POSITION AND RAILWAY CRADLE.—(See page 185.)

a cubic foot of air from the first working place to the return air was—in summer, 11.1 grains 3½; in winter, 9.55 grains 3½. The observations showed how quickly and readily the air assumed the temperature of the surrounding strata, which was, of course, independent of surface temperature, and that the difference between the quantity of vapor in a cubic foot of air on the surface and in the return air was greater the lower the temperature was on the surface. The colder air was the less moisture it was likely to contain, and its absorbing power for moisture, and consequently its drying power increased the hotter it became.

Several observations showed greater temperatures in unventilated places and goes than in the air current close by. On diverting the air current from waste in some seams the amount of vapor in the air increased after a few minutes, whilst the temperature remained pretty constant. This pointed to slow combustion in the gob. The time when workings would have reached the greatest workable depth was still remote. Air, under ordinary pressure or un-compressed, would avail little towards increasing the workable depth in extensive workings, owing to the air so readily assuming the temperature of the surrounding rock.

erty is valuable. The mine, as heretofore stated in the PRESS, is up Slug canyon. He says there is enough quartz in sight that will pay to mill to last fully a year. It costs \$1.50 to mine and \$1 to mill a ton of the ore, leaving a wide margin for profit. The water is about all pumped out of the Marguerite shaft near Sierra city and this mill will be started in about two weeks, unless unexpected obstacles prevent. The miners are all fervently praying for storm, fearful if it does not come soon in the form of a bountiful snow fall, that their water season will be too brief for much profit.

NEW RIVER TRAIL.—The trail from Etna to New River, via Sawyer's Bar, Black Bear and Yocumville, just now commends itself as being the best, nearest and quickest route to reach the new El Dorado. The fact that pack trains are making regular trips between the two terminal points, while all other trails are closed, merits the consideration of those who wish to visit the mines early.—Yreka Union.

FIVE DAYS' RUN from the Modoc furnace at Darwin, Inyo county, Cal., produces 72,318 pounds of bullion, valued at \$10,594.96. The ore contains 36 per cent of lead, 69 ounces of silver and \$12 in gold per ton.

as yet, is not extensive, for so promising a district. The Bonanza King is the leading, and in fact the only mine in the district, the others being merely prospects, a few of which, however, already promise to rival the Bonanza King in the future. The King is now down on mineral to the depth of about 800 feet. The mine is worked through a shaft hoisting the ores by machinery. A net-work of drifts, stopes and tunnels have pierced and cross-cut the ground between the walls from the surface to the 800-foot level, exposing numerous rich deposits and stringer veins of ore more or less broken near the surface, but more concentrated and uniform at the lowest depth reached. The output of the mine is now about 25 tons per day. The ores will probably average from \$50 to \$100 per ton, producing from \$35,000 to \$50,000 bullion per month. About 100 men are employed, \$3.50 being the wages paid. Board costs \$8 per week, the company having the charge of the boarding-house. On the 5th of every month some \$20,000 is paid out by the company for wages and supplies. Pay-day is never postponed, and no checks are used, coin currency being the legal tender used by the Bonanza King Co. in promptly and regularly paying their bills. This mine is now owned by a few eastern capitalists. Mr. Wilson Waddingham, of New York, is president; Samuel Kelley, general manager; H. C. Callaghan, superintendent, and M. S. Bates, chief clerk—Messrs. Waddingham and Kelley owning the most of the mine. The PRESS representative is indebted to the above mentioned gentlemen for courtesies extended. This prop-

capacity of twenty-four tons per day, and is in charge of Mr. E. Huhn, a thorough metallurgist, and he estimates the cost of milling the ores of the district at the company's mill to be \$0.50 per ton. Wood costs \$8 per cord, water being supplied from the company's springs.

Good Prospects.

On the north of the Bonanza King, the two pioneer miners of the camp, Messrs. Gorman and Dewyre, have opened up and developed quite extensively a claim quite similar in formation to the Bonanza King. The King mill has crushed some of the ores of the Bell McGillroy, this being the name of G. & D.'s mine, and returns net the owners \$60 per ton. The ores average about 100 ounces. The development so far is merely surface work, only fifty feet having been made in depth.

The Cook and Thompson group join the Belle McGillroy further north. This group consists of a number of claims more or less developed, and so far as worked show up excellent. Some of the ores in stringer veins being unusually rich. Some shipments of ore from the Mineral Point mine of this group has been made to Kingman, and the returns have shown the majority to be of a high grade. All, or nearly all, of the ores of this district are free milling. Nothing lower than 100 oz. ore will pay to freight to Fenner or to a mill.

The Perseverance on the south is one of the best looking prospects on the belt. One claim lies between the Bonanza King and the Perse-

(Concluded on page 196.)

The Inter-oceanic Ship Railway.

(Continued from page 185.)

plains, the Pass of Tarifa is reached. This is the most accessible of the many passes in this depression in the mountain chain. From here the line gradually sinks to the Pacific, reaching the plains on this side 118 miles distant from Minatitlan.

From New York to San Francisco via the Paoama Canal, a steamship would be compelled to pass the Isthmus of Tehuantepec, sail south a long distance, and after crossing sail north again the same distance before reaching the short route to San Francisco. In other words, she would have to traverse about 1,200 miles more than if she had crossed the Isthmus at Tehuantepec. From Gulf ports to San Francisco and the East the difference in distance in favor of Tehuantepec is still more marked; the route between New Orleans and San Francisco via Tehuantepec being about nineteen hundred (1,900) miles shorter than via Panama. From Liverpool to San Francisco there is a saving of 600 miles via Tehuantepec. With sailing vessels—and sailing vessels, much as we hear of steamers, carry fully three-quarters of the world's freights to-day, and are likely to continue to carry slow freights—the contrast is still more marked. However, sailing vessels which are floated across the Isthmus via Panama are left in a region of almost perpetual calm, and have to go hundreds of miles before reaching the trade wind regions. It would be a generous estimate to allow for only ten days'—good authorities say from 20 to 30 days'—delay between the Pacific side of the Panama Canal and the point where a sailing ship strikes the northeast trades, by reason of calms and the slow progress made while in tow. Allowing that a sailing ship can average 170 statute miles in a day's run, this would add 1,700 miles to the 1,200 miles extra run required via Panama, and hence would serve, practically, to make the Tehuantepec route 2,900 miles shorter in the run from New York to San Francisco, and 3,500 miles shorter in the run from New Orleans to San Francisco.

To the ship railway project a ship is lifted out of the water by means of a submerged pontoon, similar to those in use all over the world; but no such force as that used in hauling a ship up out of the water on a marine railway is required on the ship railway, although, as well known, ships are constantly taken on the marine railway without injury. In the Eads' system, however, there is no necessity for using any force whatever on the ship itself.

It is lifted out of the water in a cradle which rests upon a series of rails; and these being brought even with the tracks on the dry land, the cradle, in its capacity of a car, is wheeled along an almost level railway across the Isthmus of Tehuantepec, and when it reaches the other side a similar means is employed to float it again. This is the whole project—a combination of the lifting dock in general use, and an improvement upon the marine railway, because the ship is never, as in the latter, required to heave off an even keel.

The engravings which appear in this article (which will be concluded in next week's issue) will give a good idea of some of the details of the plans. The cuts originally appeared in the *Scientific American*, and we obtained them for the Press from the Eads' Ship Railway Company, New York, to which we are indebted also for information additional to that which has been before published.

The pontoon, or floating dock (see Figs. 1 to 4), is of the same general construction as those in use all over the world, save in some important modifications rendered necessary to fit for its especial work. For it is not enough that the vessel should be docked and lifted out of the water, but that it shall be caused to rest upon a cradle in such a manner that its weight shall be equalized fore and aft, and thus enable the carriage with its load to move easily and safely. This is effected by means of a system of hydraulic rams arranged along an intermediate deck about six feet below the upper deck of the pontoon (see Fig. 2). The arrangement of the rams is in both lateral and longitudinal lines, the former standing a little less than seven feet apart, the one from the other. The area of the combined rams in each lateral line is the same; the area of the one ram under the keel forward or aft is equal to the area of the five or seven rams amidships. They may be connected and made to work in unison, so that the same pressure per square inch of surface of the rams will exist throughout the whole system, or they may be disconnected by valves, so that a greater pressure may be brought upon the rams in a certain section or on a certain line. It is no part of the duty of these rams to lift the vessel.

They are designed only to resist its weight as it gradually emerges from the basin. They get their power from a hydraulic pump placed on a tower affixed to the side of the pontoon, and rising and sinking with it, but of such a height that, even when the pontoon rests upon the bottom of the dock, it is not entirely submerged. The pontoon itself is directed by powerful guides, which cause it to descend and emerge from the water always in the same position.

A ship having entered the mouth of the Coatzacoalcas River, on the Atlantic side, and come up to the basin, the carriage with its cradle is run on to the floating dock, then water is let into the compartments of the pontoon, and dock and cradle gradually sink to the bottom.

Then the ship is brought in from the exterior basin, and so adjusted as to position that her keel will be immediately over the continuous keel block of the cradle, and her center of gravity over the center of the carriage. The water is then pumped out of the submerged pontoon in the manner employed in floating dock systems, and it rises gradually, bringing the cradle up under the ship's hull (see Fig. 2). As soon as the keel block of the cradle is close to the ship's keel, the hydraulic pump is called into action, and pushes up the pendont rods and posts of the supports gently against the vessel, closely following the lines of her hull and the run of the bilge. The pressure upon the rams increases as the vessel emerges from the water, but the water pressure under them being prevented from escaping by the closing of the valves, the ship's weight, when she stands clear of the water, is borne by the rams by means of the supports.

In the case of a ship weighing 5,000 tons, each of the 50 lines of rams would, of course, be called to sustain a burden of exactly 100 tons; and these lines being placed at equal distances the one from the other, it will readily be seen that each unit of the ship's weight is equally distributed. The weight and displacement of the vessel is learned from the pressure gauge on the hydraulic pump.

The vessel being clear of the water, hand wheels or adjusting nuts that move in threads cut in the columns of the supports are run down to the bearings on the girder plates, whereupon the valve is opened and the rams withdrawn, leaving the girders to support the weight of the ship. Now, each girder has the same number of wheels, and as described above, hears its just proportion of weight; and no more; hence, each of the multitudes of wheels under the carriage is called upon to bear the same weight. This weight has been calculated to be only from 8 to 9 tons, though the wheels will be tested to 20. One of the many ingenious contrivances in the scheme is the "hydraulic governor," so called, and by which the unevenness of the plane of the pontoon when it is rising or falling with its load can be readily corrected. This apparatus is thus described:

Two cylinders are attached to each corner of the dock, one being upright and the other inverted. Plungers attached to the pontoons move in them. The two cylinders on diagonal corners are connected by pipes, and all spaces in the cylinders and pipes are filled solid with water. As the pontoon rises, the water forced out of one cylinder by the ascending plunger is forced into the inverted cylinder on the diagonal corner where the plunger is being withdrawn. Now, if there is, say 100 tons preponderance on one end of the pontoon, one-half this weight, or 50 tons pressure, will be exerted by each plunger on that end upon the water in its cylinder. This pressure is instantaneously transmitted through the pipes to the water in the top of the upright cylinder on the diagonal corner, which acts with the same amount of pressure as a water plunger upon the metal plunger to hold it down; thus an equilibrium is maintained, and the pontoon compelled to rise and fall perfectly level. It is possible by aid of a pressure gauge attached to the pipes to ascertain the exact amount of the excess of weight, so that, should this gauge show too great a preponderance, the pontoon must be lowered and the ship placed in a new position.

The pontoon cannot elevate the rails on its deck above what would be a prolongation of the rails ashore, because of the heads of the anchor bolts or guiding rods, and these will also prevent any tipping of the pontoon when the ship-burdened cradle is moving off. The carriage with its cradle, which comes up upon the submerged deck, is calculated to hold a ship even more firmly than the launching cradle used at the ship-yards, with its shores and stays. This carriage moves upon six rails, three standard gauge tracks each of four feet eight and one-half inches. Ships themselves are girders, and must of themselves be so, from stern to stern, because in the tempestuous seas in which they are designed to roam, the one part is constantly being called upon to support the other; now her bow projects over a great billow with no hing under to support it, and again she is poised upon a huge wave, leaving the midship section to support in great measure both the bow and the stern, and were she not constructed as a girder fore and aft her back would be broken in the first big seas she encountered. Comprehending this, the designers of the ship-carriage make its strength reach its maximum in the cross girders, which are spaced like the lateral loes of the rams already described; that is to say, seven feet apart and having sufficient depth and material in their plates to insure an equal deposit of weight upon all the wheels. These latter are double-flanged and are placed close together, each being hung independently on its own journals, and having its own axle. Under an ordinary railway car the four or six-wheel trucks move together about a center pin, but in the ship-carriage, which is not designed to move off from an almost straight line, this is not required, and greater strength is obtained by adhering to the rigid principle, elasticity being had by placing a powerful spring over each wheel. These springs will, as said before, bear a weight of twenty tons and have a vertical movement of about six inches, while the maximum weight they will be called upon to bear will not depress them more than three inches, and allow for crossing irregularities without bringing an undue weight upon the wheels.

There is also a system of supports for the ves-

sel, each having adjustable surfaces hinged to the top of the supports by a toggle joint, in such a way that they may be made to closely follow every depression and yield easily to every protuberance or bulging. They pierce the girders of the carriage, and are exactly pendent over the hydraulic rams when the carriage is on the pontoon and rests in its proper position. Thus, as will be seen, the ship when crossing the Isthmus rests upon what might be called a cushion, and indeed she will have experienced far rougher treatment, both in the Atlantic and Pacific under only ordinary conditions of weather, than that had while in transit by rail across the isthmus.

In our illustrations, Fig. 1 shows an elevation of the adjusting of the screw standards for supporting the vessel on the pontoon, the details of these standards being given in Fig. 4. A is the standard, having a head plate with universal joint, its top cushioned with rubber or canvas, to prevent damage to the ship; B is an adjusting nut, which, when the rams are down, stops the descent of the jack by contact with the top side of the main girder, C, on which they will rest, D being the top of the hydraulic jack of the pontoon, the number of these jacks used being better shown in Fig. 3, a perspective of the floating pontoon. E F G, in Fig. 2, show the sectional girders by which the weight of the vessel is distributed on the jacks. H shows one of the upper pontoon sections. J shows an arrangement in connection with the pump on pumping tower, L, to distribute the load of the vessel equally on all the jacks. I and K show the arrangement by which the water is exhausted from the pontoon. On each side of the basin there are several rods, on top of which are nuts capable of holding the pontoons, to prevent its rising above the level of the railway when the ship and cradle have been taken off. Fig. 5, on page 189, gives a general view of the lifting portion and railway cradle.

(Continued next week.)

The Miners' Appeal.

The Miners' Association, during the last days of the session of the Legislature, presented the following petition, which, however, did no good, as the Cross bill, which was drawn to give them relief, was defeated.

To the Assembly of California.—The last hours of the session of the Legislature for 1885 find the bill introduced into your honorable body to enable the miners to continue their industry legally without injury to any and benefit to all, not yet reported from the committee, and by the aid of the irrigators, defeated in the Senate; and representing, as we do, the miners of the State, our sense of duty impels us to make one last appeal for protection and justice at your hands. No question of more vital importance was ever presented to the Legislature of any State in the Union. We come asking for bread for the vast constituency we represent; will you give them a stone? Hear us for our cause; turn not a deaf ear to the supplications of the thousands and tens of thousands whose now happy homes will be made desolate by non-action on your part. The day has come when the *per diem* of the members of the Legislature must stop; but is there no pay except in dollars? Is not the approval of one's own conscience, the gratitude of men, the smiles of women and the happiness of innocent children sometimes worth more? As those who step somewhat outside the bounds of duty to obstruct and defeat all consideration of these bills will forever receive the condemnation of every true friend of California—so will those who now sacrifice something in the cause of justice receive at the hands of the people the ever welcome plaudit, "Well done, good and faithful servants." Will you adjourn and go to your homes without even hearing the cause of those we represent?

You know that thousands upon thousands of people went upon the bleak and arid mountain sides of the forbidding Sierra Nevada, and into the depths of the most desolate canyons, in search of the royal metal, gold, because it could not be found elsewhere—and, under what they thought the laws of the State and of the nation, constructed enormous reservoirs to store water; built thousands of miles of canals to divert and carry this water, over the roughest portion of the State, to their mines; they lived in flimsy huts or in caves, or in the open air, or in tents affording insufficient shelter from the burning sun of summer and the snows and freezing blasts of winter. They were poorly clad and lived on the coarsest food, not enough, in many instances, to support life while they were digging ditches, building reservoirs, running long tunnels, turning rivers from their beds, and waited for the opening, and developing their mines—out of which beautiful homes have been made and large and prosperous local communities have been built up—our State created, and the gold furnished and distributed with a lavish hand, even to the extent of the support of our Government in its hour of trial.

These people have demonstrated that California can be made to sustain a nation.

That this way, pointed out by these miners, millions of capital was invested in mining enterprises throughout the State, and wealth in solid gold was created to the extent of 1,500 millions or more of dollars.

But now comes an interpretation of law that these facts and doings of the miners and their diversions of water and its use, are wrong and illegal—that a man who has not lived in the

State for a generation, and who happens to own a few acres of land bordering upon one of these streams, has the right to have this stream run past his land undiminished in quantity and unpolluted in quality, and to preserve that right, all mining must cease—the beautiful homes must go to ruin, the prosperous communities must leave and the mining districts must be left untenanted and desolate, except by a few Chinamen. Schools and churches must be closed and the miner and his family must seek a new home.

Is this the judgment of the California Legislature? The people we represent are an intelligent, cultivated, earnest, hard-working, law-abiding people. They are non-producers of everything, except gold, that they eat or wear or consume, and as such are a desirable population for our farmers and manufacturers to find a market among. They wish to proceed by legal methods and deprecate one idea of being driven to resort to other measures to protect their property and all they hold dear.

Hundreds of suits involving the destruction of their property and the absolute ruin of thousands, have been instituted to compel them to close their mines and shut off the life-giving water, without which they cannot be worked.

Suppose the final order comes, and the officers of the law attempt to do an act that will desolate the country? Will free-born American citizens submit to such a wrong? Would not blood mingle with the waters that flow out over and into the mines? In such a contest would not cowardice itself throw away the scabbard?

These people are willing to pay all damage lawfully awarded to any one on account of the diversion of water, or from their mining operations, but they ask that no one shall be allowed to deprive them of the use of the water or their mines, or levy tribute on them.

Is it unreasonable that they ask you to fix some mode of procedure for determining what they shall do, how much they shall pay in doing so, to those who claim to be damaged through their operations and their use of their water?

Is it unreasonable that they ask you to fix some rules for distributing this cost among themselves? This is all that the bill introduced into your Honorable Assembly and defeated in the Senate proposes to do. We ask you to bring it up and give it consideration. So great an interest as that we represent cannot and should not be ignored.

If this measure has not been brought forward faster, it has not been the fault of its friends; neither has it been the fault of those whose very existence may depend upon your action.

We have spoken thus far in behalf of our present population; but we add to this a prayer for the future of California. We beg that you will not, by non-action, destroy for years the bright future of our State.

We are credibly informed that the eyes of all the East, as well as of Europe, are upon us in this matter, and that we need not expect any immigration of honest miners to add to our population and wealth, or any investment of either home or foreign capital to develop our well-known and most valuable mineral deposits, unless you enact laws under which mining will be legally possible.

THE MINERS' ASSOCIATION.

San Francisco, March 5, 1885.

Miners' Wages in Idaho.

The trouble between the miners and the mine owners at Broadford and vicinity, have not yet been amicably settled, says the *Ketchum Key-stone*, but no doubt will be in the course of a few days. Miners or others have the right to refuse to work at prices that don't suit them, but they have not the right to take possession of the property of others and prevent them from employing whom they please. While we do not advocate the reduction of wages in any branch of business, yet, at the same time, we think men should make the best of the situation until they can do better. If they wish to work at all, it is better to work at \$3.50 or even \$3, than to remain idle.

Miners' wages are coming down all over the West, and before a twelvemonth has passed, \$3 will be the established price for a day's work in mines of the Pacific Slope. The reduction is not made through choice. Mine owners are as much compelled to economize in times of general depression as men are in other branches of business. All mines being worked do not pay. There was never but one Comstock, one Ontario, one Horn Silver, one General Custer, one Consolidated Eureka, one Iron Silver, while there have been, and are yet, thousands of mines with a history that do not afford a dividend, and many of these even refuse to give back the money that has been put into them. On the other hand, many mines, now unproductive, could be made to pay reasonable interest at \$3 or \$3.50 per day for labor.

The mine owner has but this alternative—make his mine yield something more than expenses or close it down. Matters of this kind should be considered in a cool, common-sense light, and not in a spirit of hatred and revenge. Men should have a hearing of dignity and a spirit of independence. If they are informed by their employer that \$4 cannot be paid any longer, but that \$3.50 can, they should, at least, quietly quit if they are bound to an association that compels them to work for no less than \$4, and give others a show who are willing to work for \$3.50.

Where, we ask, can the practical miner go

MINING AND SCIENTIFIC PRESS.

An Illustrated Journal of Mining, Popular Science and General News.

BY DEWEY & CO.,
Publishers.

SAN FRANCISCO, SATURDAY, MARCH 28, 1885.

VOLUME XLXX
Number 13.

The Interoceanic Ship Railway.

Continued from Last Issue.

As stated in the article in last week's PRESS, the road is designed to be almost exactly straight, since there will be no curves having a radius of less than 20 miles, for the carriage is

toon will be firmly grounded upon the circular hearers of the basin, when the carriage is run upon it, by the admission of water. This is pumped out by a powerful centrifugal pump, the water being drawn through the cylindrical pivot of the pontoon, which is hollow, and discharged into the basin. When the pontoon

over the Isthmian railway will not differ from those in ordinary use, except that they will have about twice the traction power of the most powerful locomotives that run on ordinary railroads. The big freight engines of the day have no difficulty, as we know, in drawing freight trains of a total of 1,500 tons; and as

of 5,000,000 tons in 1883 for any passage across the Isthmus. Four dollars the ton would have but a moderate charge—the Panama Railroad demands \$15 a ton. This would give \$20,000,000 as gross receipts. Now, it has been estimated that 40 per cent of this would pay all working expenses, thus leaving \$12,000,000 all

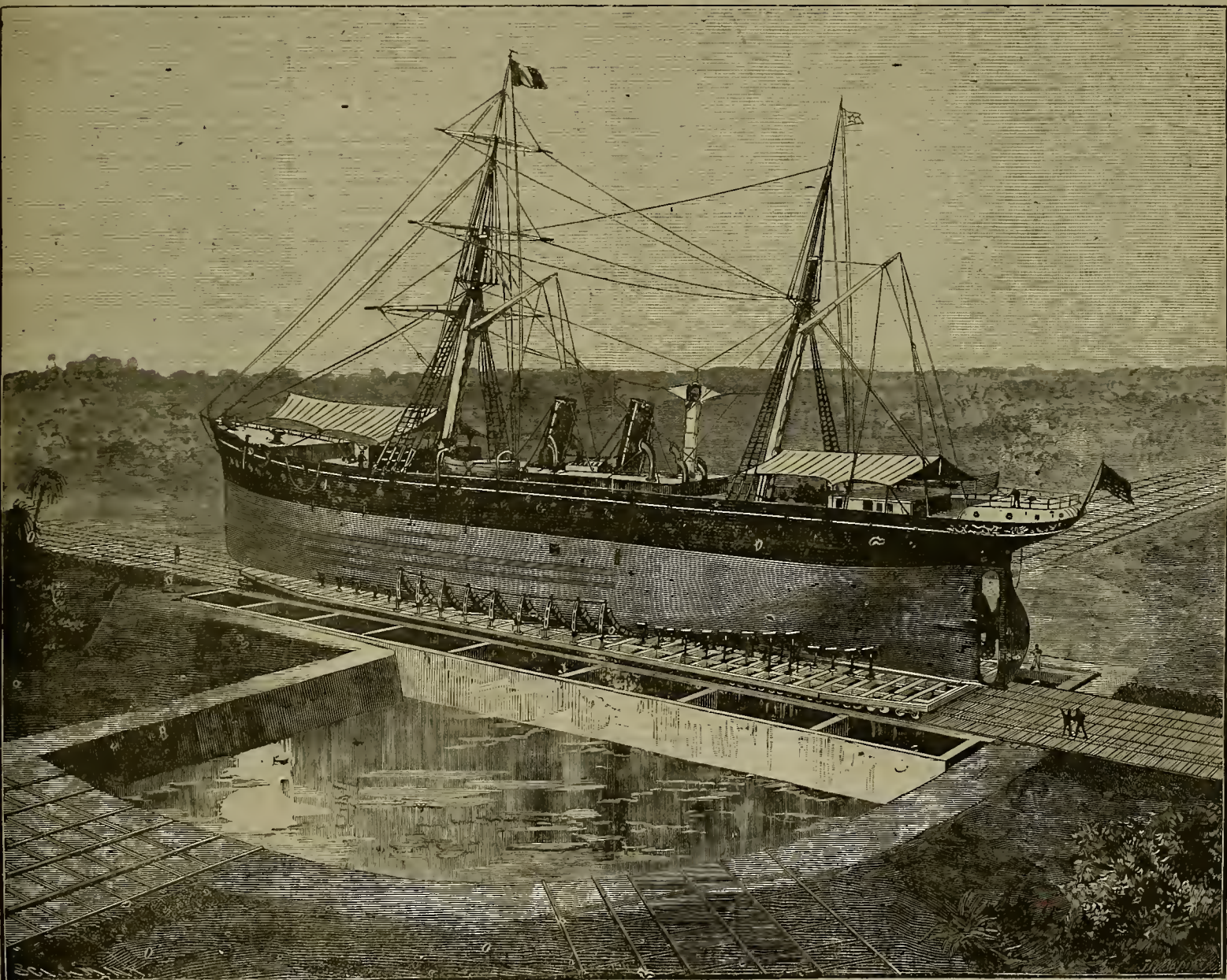


Fig. 1.—THE INTEROCEANIC SHIP RAILWAY—THE TURN-TABLE.

400 feet long, and rests upon wheels which, as already explained, are not set on trucks swinging to a common center. There are only five places in the whole line where it is necessary to deviate from a straight line, and at each of these places a floating turn-table will be built. Fig. 1 on this page gives a view of the floating turn-table, and Figs. 2-3, on page 205, are also illustrations of the turn-table system, which are self-explanatory. These turn-tables in design resemble pontoons, for they rest upon water, and will be strong enough to receive the carriage and its burden. The turn-table pon-

has been made sufficiently buoyant to be turned easily upon its pivot by steam power, the ship carriage is then quickly pointed in its new direction. The valves then permit the water to enter once more, and the pontoon turn-table again rests on its bearings. These turn-tables may be made to serve another purpose. By their means a ship can be run off on a siding, so to speak, where she can be scraped, painted, coppered, calked, or otherwise repaired without removal from her cradle, and thus be saved the heavy expense of going on a dry dock.

The locomotives for hauling the ship carriage

the ship carriage moves along three tracks it would be easy, if such a course were necessary, to place three locomotives in front of it and three behind. The time estimated for crossing from ocean to ocean is only 16 hours. The engraving (Fig. 4) on page 206 shows the method by which a steamship is to be carried over the railway.

The cost of the ship railway as computed by expert engineers will be about fifty million dollars (\$50,000,000).

A careful estimate has shown that it would not be unreasonable to look for a gross tonnage

net profit, or 12 per cent on a capitalization of \$100,000,000.

The Tehautepec Ship Railway is a private enterprise that does not ask a dollar from the Government, and there will be little trouble in its construction, if the Government does not by legislation, or by committing itself to the Nicaragua canal scheme, injure its prospects and defeat its aim, which is to furnish a cheap, rapid and safe passage for ships across that narrow strip of land, which heretofore has proved an effectual barrier to aspiring canal builders.

The company supporting Mr. Eads and which

owns the concession granted by Mexico, and is composed of some of the most wealthy and influential men in Pittsburg, St. Louis, New Orleans and other cities. They are thoroughly in earnest, and determined to build the ship railway.

It is by far the shortest distance by water between our Eastern and Western ports. It is a direct and necessary supplement to the Mississippi river, and is virtually its commercial extension into the Pacific Ocean.

While the benefits are incalculable to the Mississippi valley and the Atlantic ports, and in fact to the whole of our country lying east of the Rocky mountains, the greatest and most direct benefits are those to be reached by our whole Pacific Coast. There is no doubt that the gradual decrease in ocean rates for freight has worked to the advantage of our Pacific coast, as the decrease in rail and ocean freights has been of immense advantage to the vast area lying west of the Mississippi river, even to the base of the Rocky mountains. The cheapening of transportation of agricultural products has changed this wilderness into a garden; but on the Pacific Coast, though there are there, great natural advantages, no relief adequate to our wants has yet been devised. Railroads, several in number, have been extended east and west and connected us with the Atlantic Coast, but still we cannot reach Europe with our heavy products except by a voyage of about sixteen thousand miles. We have a climate and a soil the most favorable in the world for cereal productions; we can raise them as cheaply as any country—cheaper than any other part of the United States; but not being able to reach the world's markets except by a long and expensive voyage, we cannot compete with India and Australia since the opening of the Suez canal, and the wonderful development of those countries by the money and enterprise of England. India, especially, is crowding us out of the European markets. The Tehuantepec Ship Railway ought to re-establish our supremacy in the wheat trade and wheat production. We can then compete with any country, for we will have brought two months nearer the European markets. It has been stated by experts on this subject, that the successful inauguration and operation of the ship railway, will double our cereal productions within three years. But this is not all. It will bring us into more direct and intimate relations, both in manufactures and commerce with our own country from the Rio Grande to Maine. The heavy and slow freights especially, that it does not pay to haul over the transcontinental railways, will then, by a quick voyage, be placed at Galveston, New Orleans, Baltimore, Philadelphia and New York and Boston for the use of the immense population tributary to these ports.

It is generally conceded in comparing land and water routes, that four miles of water transportation on the ocean is equivalent in cost to one mile of rail transportation. See how this will figure out. The distance from San Francisco to New York by the Central and Union Pacific Railways is 3,340 miles; by the Tehuantepec All-Water Route, 4,905 miles. By the above rule, the former is equivalent to 13,360 miles of water transportation. The distance from San Francisco to New Orleans is about 2,400 miles by rail and 3,576 by water, the former being equivalent to 9,600 miles of water transportation. This gives the ship railway route an immense advantage over any present routes by rail, and, as has been previously seen, over any present water routes. And, from the distances given in this article, it also has an advantage over any other projected inter-oceanic route by means of a canal.

As Commodore Schufeldt stated in 1871, in an official report of his survey of the Isthmus of Tehuantepec: Each isthmus rises into importance as it lies nearer to the center of the American commercial interests. Any intrinsic value of this eminently national work ought to be based upon the inverse ratio of the distance from that center.

An all-water route by way of Tehuantepec connects the east and west coast lines of the United States and Mexico, and as it were, renders our own Territory circumnavigable.

Again, the conditions that we have given in reference to the winds and currents are very important to American commerce especially. It has been stated that sailing vessels are giving way rapidly to steamships; but from the late report of Mr. Jarvis Patten, the United States Commissioner of Navigation, we are disposed to believe that the sailing ship still holds its own. For he gives as the total number of sea-going sailing ships owned by citizens of the United States, 6114, with a tonnage of 2,099,218; while there are but 422 steamships, with a tonnage of 601,186.

Another very important statement made by him is this:

That we in this country, with our excellent woods, which can be obtained at reasonable prices, can build sailing ships at from \$50 to \$55 per ton; but that it costs us to build iron ships from \$65 to \$75 per ton. On the other hand, it costs England to build wooden sailing ships \$75 to \$80 per ton; but they can build iron ships at from \$50 to \$60 per ton.

It is therefore very important for our American commerce and for our merchant marine that the inter-oceanic route should be located where it can be used to advantage by our sailing vessels. The importance of this will be appreciated by every commercial man along the Atlantic and Pacific Coasts, for we are still building these fine wooden sailing ships for the

San Francisco trade and for other sea-going business.

Again, if this country desired to control the inter-oceanic route, and to be able to defend it, let it adopt a route that is capable of defense. At Tehuantepec, with a favorable treaty with the Government of Mexico, and by means of railway lines that are extended and are extending from the United States to the Mexican capital, and beyond even to Tehuantepec by American citizens, a land force of 100,000 men could be quickly transported from the Pacific Coast, Mississippi valley and the Atlantic Coast to meet an invading force.

The Gulf of Mexico, if we have a navy that can do any defensive work, can be easily protected, as the only two outlets to it from the ocean are at the Florida Straits and between Yucatan and Cuba.

This route therefore is vastly superior to any other as a strategic point. Mexico is a sister republic, bound to us with ties that are growing stronger and stronger with every dollar of American money that is spent on her soil in building railroads and other constructions for the development of that country. She has a population of 10,000,000. When free from the harassing complications which invasions of her soil and overturning of her legitimate governments have brought upon her, she will be a strong republic, well advanced in agricultural, industrial and commercial prospects, and enabled to be an adequate ally of the United States.

There are already four main longitudinal trunk lines of railroad building, and in the course of construction from the American border.

Another immense advantage to the whole Pacific Coast by the construction of the ship railway will be the impetus it will give to immigration from European countries. We need, especially for the increased cultivation of our soil that the ship railway will bring about, these hardy agricultural immigrants, who now do not reach us, on account of the great expense of transportation over the transcontinental railroads. With our country filled up with these industrious people, who so easily will become a part of our body politic, we can then relegate to their own country the unassimilating Chinese population that have infested our coast.

Now that the Congress of the United States has refused to ratify the Nicaragua canal treaty, and there are such grave doubts in regard to the completion of the Panama canal, we must rely upon the Tehuantepec Ship Railway as the solution of this great problem of transportation so directly and essentially effecting our prosperity.

CORRESPONDENCE.

We admit, unendorsed, opinions of correspondents.—Eos.

Arizona.

Mojave County Mining Districts.

[From our Traveling Correspondent.]

The surface indications of the many districts of Mojave county indicate the existence of great wealth. Gold and silver ores, free-milling and smelting, abound in numerous formations. Nowhere in the Territory, or on the coast for that matter, do the indications justify the outlay of capital or show the neglect of legitimate mining as this rich and undeveloped county. Mismanagement of capital and extravagant farmer or commercial "mining superintendents," who spend the money given them for development for wine, women and thrashing machines, contractors or mills and machinery necessary for a mine long before they had done even enough development to uncover mineral, or had learned the treatment required for their ores, has hurt Mojave's reputation away from home.

High Priced Prospects.

The greatest drawback to this, as well as any other district, is the usual high-priced miner. Nearly every good-looking prospect in the county is owned by a poor miner, and not one in ten would sell their prospect at anything near its actual value. This and a desire to have low rates on ore, a home smelter and somebody to take out their ores, appears to have been the leading characteristics of miners of this district in the past. Twenty thousand dollars expended in Mojave county on a good prospect, in a systematic and business-like manner, would develop more ground and produce more bullion than four times that amount expended by a few hundred men in the happy-go-lucky way of the chloriders and prospectors of the county.

The Ores and Markets.

The mineralized rocks of the district are gold, lead and argentiferous. Veins, ledges, deposits and fissures are claimed as ore producing; the ores being both free-milling and smelting. Miners can sell their ores at Kingman station at 90 per cent of their assay value. The working charge on the same being \$30 per ton. Sampling charges \$5 per ton. The basis of settlement for ore is made on the New York quotations of silver and upon the result of the scorification assay, which is the standard basis of the Eastern market. The Colorado and Eastern markets get most of the ore shipments

of this district. The following prices will show what ores bring at Kingman.

Ounces per ton.....	150	Price per ton.....	\$113.10
" " " " " " " "	200	" " " " " " " "	160.80
" " " " " " " "	250	" " " " " " " "	208.50
" " " " " " " "	300	" " " " " " " "	256.20
" " " " " " " "	500	" " " " " " " "	447.00

The freight and treatment on ores shipped to Pueblo and Denver is \$26.25 per ton. Nothing less than \$50 ore will pay to handle thus. Several cars per month are shipped to Colorado. There is talk of ex-Governor J. B. Grant, of Colorado, building a smelter at Albuquerque, New Mexico. If this is done and low rates are given by the A. & P. people, there will be a boom in the mining interests of all the districts tributary to the line of the road, and immense dumps of low grade ores that cannot now be handled will pay handsomely for shipment.

Mining Districts.

South of the line of the A. & P., 10 miles from Kingman, is the Maynard district. The American Flag, the leading mine, is quite extensively developed; the ore is sulphuret and chloride and runs on an average about 100 oz. per ton. The cost of packing and freighting ore to Kingman is \$10 per ton.

Cedar valley, some 30 miles further south, boasts of producing some wonderfully rich ore. A few days since 10 sacks of ore weighing 1,000 pounds was brought to Kingman from the Hibernia mine and sold for \$250. Water and wood are not very scarce in these districts. Access to some of the mines is somewhat difficult, and jacks are used to pack ore to the wagon roads, thus making it more expensive to freight the ores to market. Work will be carried on extensively in this district during the coming summer.

North of the railroad are a number of districts more or less rich in the making of good mines. Stockton Hill, some 10 miles from Kingman, is attracting attention by recent rich strikes in galena, wire, and ruby silver deposits that run all the way from 53 ozs. silver and 30 per cent lead to the pure stuff.

Mineral Park is a "has been" camp of much notoriety, and has yet untold and undiscovered wealth that only requires capital to expose. Very little is being done in or about the camp. It is the county seat and its inhabitants are not many more than are needed to run the affairs of the county and the mercantile and irrigation (saloons) business of the place.

Gold Basin, San Francisco, Lost Basin and a number of other quartz gold-bearing districts are adjacent to the Park, and there has been some fine prospects found of late, and a number of stamp mills will be put up this summer. The ores run from \$20 to \$200 per ton.

Sluicings.

The Tigris, at Stockton Hill, is shipping ore to Kingman.

John Mackenzie, the popular ex-County Clerk, has a bonanza in Indian Boy mine, at Stockton Hill. Their recent find of wire silver beats anything of the kind in the county.

Deputy Sheriff Keencer and others have a fine gold mine in the San Francisco district. Postmaster Krider, of Mineral Park, is largely interested in Gold Basin mines.

Roe Brothers, of the Park, will work a number of claims in the Salt Springs district this summer.

Among other future millionaires at present working "inoc" is J. W. Hass, who is running a 300-foot tunnel on the Woodchoppers' Relief.

Bob Steen, the sheriff of Mojave, is very popular among the miners.

The 10-stamp mill of Hon. John Howell, at Hookberry, is cleaning up on a lot of chlorider's ore, and will close down for some time.

The Lone Star mine at Mineral Park is the most extensively developed property in the county. It is not working at present. J. L. Sanderson and others of San Francisco are the owners.

A smelter at Albuquerque and low rates on ore will double Mojave county's output of bullion.

Prospectors are rustling among the hills, and the season's work will develop a number of good mines.

The Mojave County Miner, at Mineral Park, is fully alive to the interests of the miner and mine owner as well as to its readers abroad. It deserves the support of the community.

F. W. S.

Kingman, A. T., March 22, 1885.

A California View of the Eads Ship Railway.

Some time since, L. F. Moulton, a well-known resident of Colneia, and who has always taken great interest in public enterprises, especially those affecting this coast, wrote an extended letter on the subject of the Eads Ship Railway, which was published and attracted considerable attention. Space precludes our publishing it entire, but we make the following extracts:

To the Mechanics of California.—The farmer is full partner with the San Francisco and other mechanics and manufacturers. Until we can get cheap freight we cannot raise wheat to load ships to foreign countries that can bring back cheap or half freights like coal, iron and all other raw material which is required to manufacture all classes of goods and machinery, cheap and good enough to compete with

Eastern manufactured articles that will be brought at sufficiently low rates on the return wheat cars, so as to crush out our flourishing manufactures on this coast. It is reasonable to expect that if either become crippled by having to pay full freights—say one per cent per pound one way, and empty the other—that one of the partners must be crushed, thereby crushing both. Once our farming, our manufacturing interest, gone or crippled, and all other interests dependent upon once crippled, then the railway companies would have to pay their taxes instead of refusing, as now. If they did not it would be hard indeed on those left, who had property and could not control the Government in their interest.

To the Farmers of California.—Our great distance from market is our great misfortune—the actual cost of transportation absorbs our profits. The past history of high freights is a terrible lesson for us to study.

Is there any reason to hope that it will be better? We see no reasonable grounds for hope in the future. It has cost 1½ cents per lb. to market our wheat. This is more than it is frequently worth in the East. It would be so today were it not for the prospect that there would not be wheat enough grown to load the ships on the way this year. The railroad, it may be claimed by its agents, is now carrying for 65 cents per hundred to the very markets that are sometimes glad to get 65 cents for their wheat. The head railroad agent, two weeks ago, said they could not carry wheat for less than one cent per pound to New Orleans; then it would have to be reloaded in that yellow fever climate on to Liverpool ships; so that it would then cost more than 1½ cts. freight to Liverpool; then add our cost of raising, sacking and getting to the nearest shipping points, and we would be toiling with no other future than inevitable ruin before us. If we have a little lower freight now, it will be just what we have dreaded and before pointed out; for do you suppose ships will again return to put themselves under the despotic power of that railroad company that has proven itself entirely soulless and terribly despotic and grasping? Yes, in every instance where they have had the power, they have proven themselves tyrants. Do you suppose they are any different now? You certainly could not be so silly as that. You know better. The Hon. W. S. Green, in a well-written article in the Colusa Sun about a year ago, pointed out the fact that the railroad company would carry freight low for one season in order to discourage the return of ships. Of course it created some adverse criticism by the railroad press.

I expected and every other farmer in the State expected to find such to be the case, and we dreaded it, for the same reason that the sailor dreads the calm more than the storm. We need the storm of competition to save us.

But, no matter how much competition we may have, we cannot get rid of the fact that by water we are 14,000 miles away from the market, and by rail it actually costs more than we can make to raise it and compete with the fast increase of wheat produced nearer to market. We must have a cheaper route, where grain will not, on the one hand, have to be carried 14,000 miles, or be reshipped in sickly ports on the other.

The ship railroad is our only hope. We must make our representatives understand our wishes. The Panama canal is the better of the two canals, but we have got to back down from our long-cherished Monroe Doctrine if we let monarchies get control of it as the English have the Suez. Then again, it will take 25 years to build it. There is 123 inches of rainfall and it is 35 feet below sea level, with unknown quantities of water to contend with, having no drainage for 30 feet in the bottom. It is one of the pickiest climates in the world. The Nicaragua I examined thirty years ago. I thought then as I think now, that it can be built; but a canal with "locks" is too slow, too costly and takes too long to build, for locks belong to a former age. Nicaragua is also a bad climate. They have jigger and other fatal pests to contend with. This progressive age demands (if at all) a canal without locks (and it may be built by future generations), but we need in the next four years the railroad to cross our ships from ocean to ocean. To defend so long a coast as we would have to defend, to enforce the Monroe Doctrine and pay expense of wars, would build several ship railroads. Then, again it would be the quickest way to settle the Monroe Doctrine to build our home route from the Gulf of Mexico instead of going as far as Nicaragua or Panama to get into a row—and the safest way to avert a war is to hurry up the ship railroad. Then declining monarchies will not build another route for glory alone. If Eads' concession from the Mexican Government is passed under control of our Government, as provided in this bill, then it protects us from these soulless corporations; but let him be broken down by Page and the railroad company, then his franchise will have to pass into other than United States possession; the railroad company will be sure to get a controlling interest, as they have just got of the new railroad, or else they will pool their issues as they have with the Panama Railroad. Our hope is in this cheap and speedy ship railroad, and it under control of the United States Government.

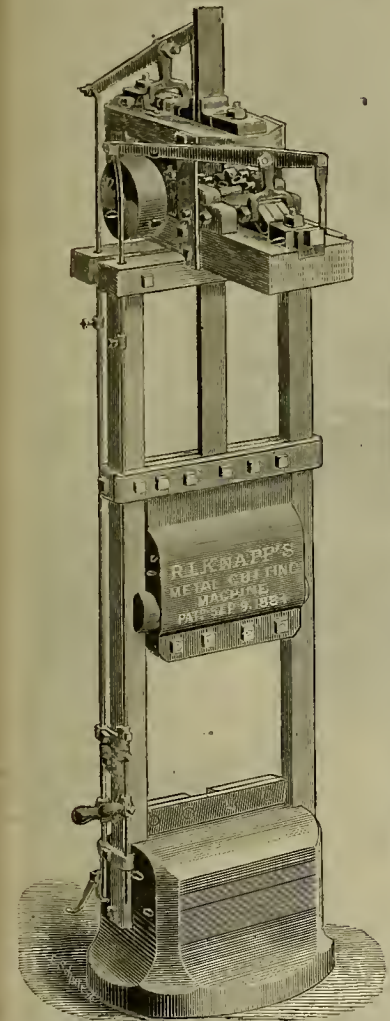
The bill for redistricting the State of Nevada for judicial purposes, making one entire district of the State, has passed the Senate.

New Metal Cutting Machine.

The usual method of cutting steel or iron bars or plates is by means of power or hydraulic shears which operate with a slow motion and under great pressure. Mr. Robert I. Knapp, of Half Moon Bay, San Mateo county, has patented, through the MINING AND SCIENTIFIC PRESS Patent Agency, an apparatus for this purpose, in which he employs the momentum of a falling or steam driven weight, carrying one of the shear blades so that it passes the other, which is stationary and upon which the plate to be cut may be held.

The engraving on this page represents the new machine as operated by a weight. There is a heavy metal base having one of the shear blades fixed to it. The guide posts are arranged on the weight bits accurately while it slides up or down. In the lower face of this weight is fixed the other blade of the cutting shears. The two blades are so fixed on their respective supports that their cutting edges will pass each other with a shearing action, one end of each being nearer together than the other end.

In order to raise the weight and control the movements, it is provided with a stem which extends up between rollers secured to shafts at the top of the guides. The driving shaft is driven by a belt on the pulley. The shaft of



KNAPP'S METAL CUTTER.

one of the rollers is journaled in a support which may be moved horizontally to or from the other roller-shaft, and this motion causes the rollers to clamp or release the stem to raise or drop it.

In order to move this support, it is fitted into horizontal guides and has one arm of a knee, or toggle-joint, connected with it, while the other arm of the joint is fixed to an adjusting plate or block. The center-pin of the toggle is connected with a lever by a link, and the long arm of the lever has a rod extending down alongside one of the guides, as shown, to a point within easy reach of the operator, while the short arm has its fulcrum in the post.

When the rod is pulled down, the toggle levers are straightened, and the slide or support carries one of the roller shafts closer to the other, until both rollers press upon the stem of the weight with sufficient force to raise the stem, and with it the weight and its blade.

A collar is fixed by a set screw on the rod, and there is an arm or projection on the weight,

so when the weight reaches the desired height it strikes the collar, and the lever is operated so as to relieve the roller from the side of the stem sufficient to let the weight drop. If it is desired to hold the hammer at its highest point, a hinged block is so placed as to allow itself to be turned up as the stem moves up, and when the rollers are relieved from pressure, and the stem begins to drop, the block falls against the stem and binds and holds, a similar block on the other side also pressing against the stem. Suitable mechanism is also employed to withdraw the clamping blocks from the stem to allow it to move freely when it is desired to drop the weight-stem and blade. A bent lever, has its angle fulcrumed in a support, so that one end of the lever stands just beneath the end of the rod, and the other depends to a point near the ground, so that the operator can touch it with the foot and then lift the rod end draw

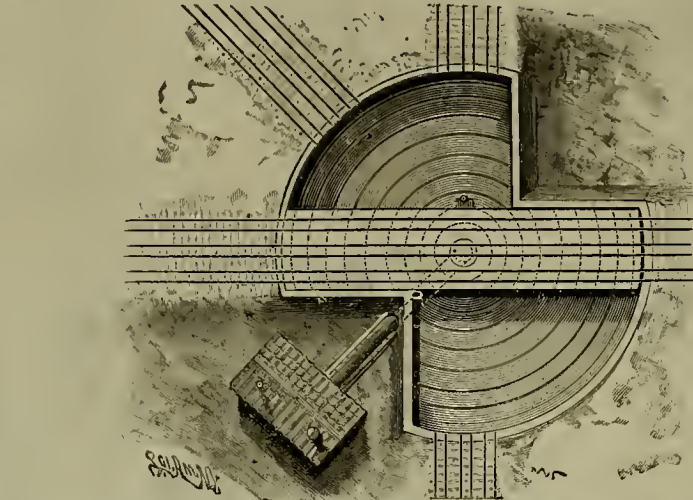


Fig. 2.—INTEROCEANIC SHIP RAILWAY—PLAN OF TURN-TABLE. (See P. 201.)

the block back, when he desires to drop the hammer.

A collar is fixed to the upright rod at such a point that when the blade has descended so as to cut the bar or plate, the arm on the block will strike this collar and force the rod, lever

State. It has not only patented the invention in the United States, but is procuring patents in all important foreign countries as well.

Governments and Mines.

Foreign Governments exercise a much closer watch over the details of the mining industry than ours does. In fact ours does very little one way or another. Congress makes laws for the miners and that is about all it does. The mines are worked in any way the owners like, without any restriction. Abroad there are Government inspectors, commissioners, etc., who look after details of work, with a view mainly of compelling proprietors to adopt and carry on systems to prevent accidents to the laboring miners. In some respects this Government surveillance is beneficial, and in others it is irksome. Take France for instance, where

they have so many commissioners of all sorts, inspectors, captains, etc., that they must be a nuisance. And the Government there even has among its monopolies that of gun-powder, which operates as a heavy tax on mining. The price of powder is three times greater than in

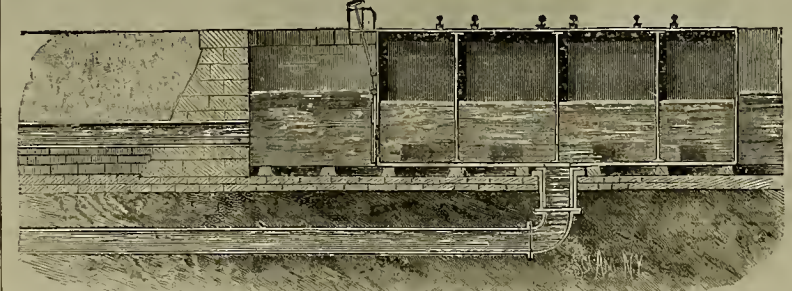


Fig. 3.—INTEROCEANIC SHIP RAILWAY—SECTION OF TURN-TABLE. (See P. 201.)

and center of the knee joint down until the rollers are again pressed against the stem with enough friction to instantly raise the movable shear-blade for another blow. Another collar is fixed on the same rod below the guide, and of such a shape that when the rod is forced down by the dropping of the shear-blade, this collar will strike the end of the pawl and release it from the rack on the other rod. The weight of the rod will then bring it down, and by its action on the lever and toggle will force the block forward so as to again be in contact with the stem, and ready to clamp and hold it when it reaches the top of its stroke.

This machine has been in practical use for the last two years at Mr. Knapp's plow manufactory at Half Moon Bay. He estimates that it will do three times the cutting of ordinary machines. Mr. A. H. Knapp held a watch on them while at work and saw them cut up 275 pounds of steel into plowshares in eight minutes.

Mr. Knapp left here a few days since for New Orleans, where he will exhibit one of these machines. He also combines with this a power punch and press, with little additional expense. Mr. Knapp is the inventor of the well-known Knapp side hill plow, the first revolving side-hill plow made on this coast. In making these plows he found the expense of cutting steel so great that he studied out this improved device. This invention will undoubtedly attract attention among iron and steel workers at New Orleans, and reflect credit both on him and his

An Electrical Bullet Explorer.

A new electrical apparatus for accurately locating the position of bullets in the human body, has recently been invented and made by Dr. James B. Williams, at No. 759 Market street, the inventor and maker of the surgical apparatus for removing abnormal growths by electricity, which was described in this paper in September last.

The new "Explorer" is contained in a small mahogany case, and consists of probes, alarms, switches and a generator of the electric current by which the apparatus is operated.

The probes are encased in gum webbing, and are so flexible that they may be tied into knots without fear of injury, and they will readily adapt themselves to any path a bullet may make. The ends are of pure gold, upon which the fluids of the body can exert no chemical action, thereby insuring a clean and absolute contact with the hall; while their shape is such that they will readily adapt themselves to either convex, concave, or flat surfaces. Laceration of the tissues by their passage, or of obstruction to their passage by the tissues, is next to impossible.

The indicating mechanism is operated by the current from a "dry" pile, and consists of an alarm which is sounded as soon as the probes come in contact with the hall, and an upright needle which swings through an arc of 150°. The alarm ceases to sound, and the needle returns to its normal position, as soon as the contact between the probe and the hall is broken. Either the alarm or the needle may be used as circumstances may require, both being controlled by ingeniously constructed switches. Both the indicating mechanism and the pile are permanently fastened to the inside of the case; the mechanism is supplied with testing appliances, thereby insuring its perfect operation before the probe is introduced.

The new dry pile which supplies the current is the Doctor's own invention, and has been perfected only after a long series of experiments. It will undoubtedly supersede hundreds of batteries now in use for domestic and other purposes, as it occupies but a very small space, is remarkably cheap, and after being set up can be attended to by a mere novice. The currents from it are very powerful, and as the pile derives its moisture from the atmosphere there is no free liquid, and the elements may be placed in cases of any desired shape. A pile sufficiently powerful to ring bells, light gas, etc., in a large building can be placed in a case measuring not more than 4 in. long, 3 in. wide and 2 of an inch deep. For portable, medical and other apparatus, as well as numerous other purposes, it is superior to any of the chloride of silver batteries now in use, Skrivanows not excepted. The pile at present used in the "Explorer" consists of 8 plates, each measuring 2x1 inch, and will furnish as strong a current as 6 large gravity cells. Comparative tests of the new pile with standard batteries will soon be made, the results of which will appear in a subsequent issue.

Army surgeons and others who have examined the "Explorer" pronounce it to be perfect and destined to supply a long felt want. Every surgeon is cognizant of the fact that the results of explorations for bullets by the best appliances now in use are all but satisfactory, in many instances amounting to complete failures.

It is but justice to Dr. Williams to state that his electrical inventions have attracted considerable attention in the Eastern States, the articles describing them having been copied from this paper into several of the medical and scientific periodicals published there. He has recently received a communication from the Secretary of the American Institute of Electrical Engineers, informing him that the Council would raise him to the rank of full membership. As far as we are informed, he is the only person on this coast who has been thus complimented. The Institute was founded by Edison, Keith and other prominent electricians of America, and numbers nearly 300 members, the greater portion of whom are but associate members.

A CHABOT has presented Oakland with \$4,000 to purchase a transit instrument, chronograph, sidereal clock, mean time clock, break-circuit chronometer, standard barometer and thermometer and polarizing eye-glass for the observatory which bears his name.

COPPER in Liverpool was selling at £7 10s. below the average of 1884, and £16 below the average of 1883. With such prices many mines must work at a loss.

Tintic, Utah.

ENTRORS PRESS:—During the calendar year 1884 there has been mined and exported from Tintic mining district an estimated gross valuation of ore approximating \$1,532,954.40; 21,808

ers make a possible net profit of \$10 per ton, no portion of which ever returns to the district to aid in the development of properties or benefit it in any way. The Utopia of the Rose of Tintic Mining Co. consists simply in the combination of mining properties with reduction

to Eureka Hill, has lately opened a fine body of ore high in silver assay. John Beck, Esq., manager of the Bullion Co., began sinking a new double compartment shaft about 100 feet southerly from present hoisting works, at a depth of about 60 feet from the surface. He has en-

say in the Lake Superior county, mining captain). All are being vigorously worked night and day. Nothing is yet being done at the Mammoth Co. property. Captain G. D. Johnson is working the property of the Con. Julian Law Mining Co., chiefly under leases. Dr.



Fig. 4.—THE INTEROCEANIC SHIP RAILWAY—A STEAMSHIP IN TRANSIT. (See page 201.)

tons of lead silver smelting ore, 1,282 tons of copper silver and gold smelting ore, 808 tons of milling ore, and 25,000 tons of iron ore. On the lead silver, copper silver and milling ores collectively there is a possible net profit of something near \$300,000. As these ores are shipped outside of the district for reduction, the smelt-

works, so that a proportion of this profit, now I may say lost, will be used to aid future operations in mines, not particularly as a fixed investment, but as a working capital, as I term it. The mines are all looking well here in Tintic. James Robbins, Esq., who has spent about \$20,000 on his Mono, just east and parallel

countered a fine ore body, high in silver assay. The Eureka Hill Company has purchased the Red Bird Consolidation property. The Eureka Hill mine, the Red Bird Co. and the Keystone, are under one ownership, of which J. Q. A. Packard is president, Captain John McChrystal, manager (or, as we used to

John F. Ely, of Cedar Rapids, Iowa, is president, and Hon. Samuel P. Ely, of Cleveland, Ohio, is treasurer. Other properties are also being worked. The *Tribune* wanted \$50 to \$60 per column this year, so that we had but little in their New Year's issue. We could not afford it. Eureka, Tintic, Utah. J. C. CAMERON.